DOCUMENT RESUME

ED 184 670 PS 011 286

AUTHOR Madey, Doren L.
TITLE Why Some Children Don't Conserve: Implications for Early Childhood Education.
INSTITUTION NTS Research Corp., Durham, N.C.
PUB DATE Jan 80
NOTE 27p.; Paper presented at the International Congress on Early Childhood Education (1st, Tel Aviv, Israel, January 6-10, 1980)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Conservation (Concept); Early Childhood Education; *Logical Thinking; Motivation; *Perception; *Preschool Children; *Research Methodology
IDENTIFIERS *Piagetian Tests

ABSTRACT

To discover what aspects of number conservation tasks prevent young children from conserving, two components of number conservation tasks were investigated. A test was made of the following two hypotheses: (1) the frequency of conservation responses varies significantly with the materials used, (2) the frequency of conservation responses varies significantly with the number of objects used. Seventy preschool children were tested individually with two materials, candy bars and wood bars, in rows containing three, five and seven objects. Half of the subjects were randomly selected from three year old classes and the other half from four year old classes. Subjects were labeled as a conserver, variable conserver, or nonconserver, depending on their answers to the experimenter's questions. Variable conservers correctly answered between one and five of six question sets. Results of the 25 variable conservers were analyzed. Using the Wilcoxon Test, it was found that children exhibit significantly more conserving responses when candy is used. Using the Cochran Q Test, it was determined that the probabilities of conserving responses are significantly different with three, five and seven objects. These results suggest that large numbers of objects and irrelevant materials may prevent young children from conserving. Results are discussed in terms of conservation theory and implications for early childhood education. (Author/RH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED184670

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Why Some Children Don't Conserve: Implications for Early Childhood Education

Paper prepared for:

International Congress on Early Childhood Education
Israel
January 6-10, 1980

Paper prepared by:

Doren L. Madey, Ph.D.
Senior Research Analyst
NTS Research Corporation
Durham, N.C. 27707
June 1979

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Doren L. Madey

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

PS011286

Abstract

In an effort to discover what it is about the number conservation task which prevents young children from conserving, the task was dissected and two of its components were investigated. The study was designed to test the following two hypotheses:

(1) the frequency of conservation responses varies significantly with the material used.

(2) the frequency of conservation responses varies significantly with the number of objects used.

Seventy preschool children were tested with two materials, candy bars and wood bars, in rows containing three, five, and seven objects. The results of the twenty-five variable conservers were analyzed. Using the Wilcoxon Test, it was determined that children exhibit significantly more conserving responses when candy is used ($p < .0001$). Using the Cochran Q Test, it was determined that the probabilities of conserving responses are significantly different with three, five, and seven objects ($p < .001$). These results indicate that large numbers and irrelevant materials may prevent young children from conserving. The results are discussed in terms of conservation theory; implications for early childhood education are also discussed.

Why Some Children Don't Conserve: Implications for Early Childhood Education

by
Doren L. Madey, Ph.D.

Conservation occurs when a particular empirical factor (weight, volume, number) remains invariant in a child's mind throughout observed changes of state (Piaget & Inhelder, 1958). The present study began with a statement of fact: some children do not conserve. Studies supporting this fact abound (e.g., Piaget, 1975; Elkind, 1961; Higgins-Trenk & Looft, 1971; Lloyd, 1971). With this fact as a foundation, this study proceeded with the question: What is it about the task which prevents a child from conserving? The ability to conserve represents a sophisticated level of cognitive development in which many separate abilities are coordinated (Gelman, 1972); dissecting the task elucidates the skills which a child needs to correctly solve a conservation problem.

The major aspects of the Piagetian conservation problem, regardless of its particular content, may be outlined symbolically. Each problem involves three consecutive time periods. Also involved are two stimuli, "A" and "B". A is the standard stimulus: it remains unchanged throughout the problem. B is the comparison stimulus: it undergoes a perceptual change at Time 2. Finally, and quite obviously, there must be a subject (S) and an experimenter (E).

S is asked to make two separate, overt judgments regarding the quantitative equivalence (or difference) of the stimuli,

once at Time 1 and again at Time 3. A third judgment is necessary for the successful completion of the problem, a judgment at Time 2, but this judgment occurs covertly.

At Time 1, A and B are equivalent in both the perceptual and quantitative senses. At Time 3, the two stimuli are equivalent only in the quantitative sense. In the interim, Time 2, E transforms the comparison stimulus, B to B^1, while S watches. B^1 is quantitatively identical to B, but perceptually different from B.

Conservers and nonconservers are filtered out at Time 3. A conserver judges A quantitatively equivalent to B^1; a nonconserver judges quantitatively different from B^1.

The three step conservation problem can be symbolized as follows:

Time 1: $A = B$

(S is questioned about the quantitative relationship between A and B. S judges A and B to be quantitatively equivalent. A and B are also perceptually equivalent.)

Time 2: $B \rightarrow B^1$

(E transfers or transforms B to B^1. B and B^1 are quantitatively equivalent. B and B^1 are <u>not</u> perceptually equivalent. S must covertly judge this identity.)

Time 3: A ? B^1

(The subject is again questioned about the quantitative relationship between the two stimuli: a conserving subject judges A = B^1; a nonconserving subject judges A ≠ B^1.)

Any specific conservation problem fits this format. It is the exact nature of the stimuli, the question, and the transformation which differ from problem to problem. To solidify the symbolism just presented, Piaget's number conservation experiment has been dissected in Figure 1.

Insert Figure 1 about here

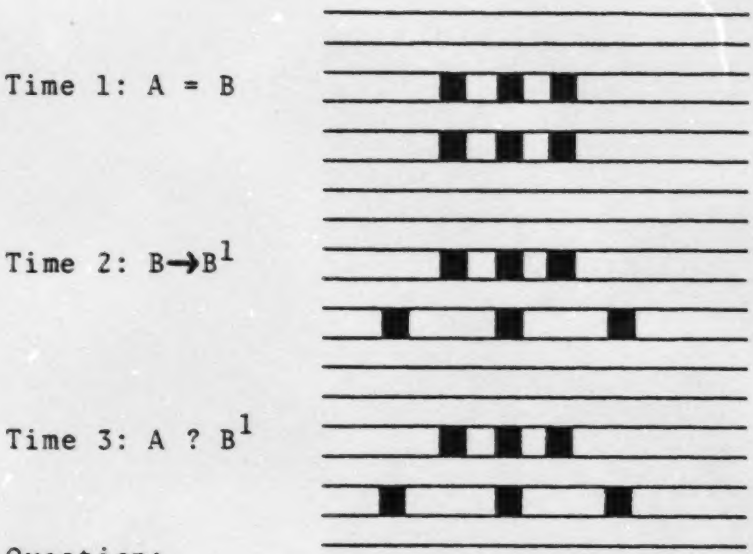
In this study, the question (Are there the same number of bars in the two rows?) and the transformation (expansion) remain constant while the stimuli is varied. The study is designed to test two hypotheses, one concerning type of stimuli or material and one concerning number. The hypotheses are that, other things being equal, (1) the frequency of conservation responses varies significantly with the material used and (2) the frequency of conservation responses varies significantly with the number of objects used.

Material

Implicit in Piaget's work on quantity is the assumption that comparisons with different materials tap the same concep-

Stimuli:

Two rows of objects identical in configuration, length, shape, spacing, and actual number.



Question:

Are there the same number of objects in the two rows?

Transformation:

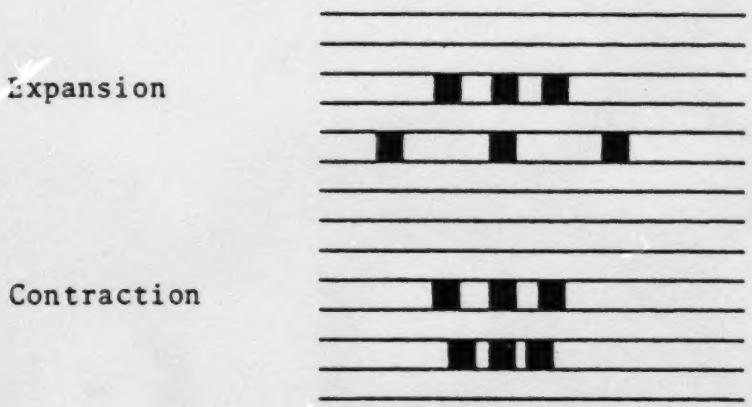


Figure 1. A Dissection of Piaget's Number Conservation Problem

tualizing ability. Results from some studies support his assumption, but such studies do not usually compare two nearly identical materials which differ only in the amount of meaning the child associates with each. An example of two such materials would be candy bars and wood bars. The candy bars may have more meaning for the child: he can eat them.

Elkind's systematic replication (1961a) of one of Piaget's investigations supports Piaget's assumption. However, the three types of materials Elkind used - sticks, liquids, and beads - differed in many respects. And no evidence was offered that one of the materials had more significance for the child than another. Gelman & Tucker (1975) concluded that material hetereogeneity did not affect accurate number estimation. Here again the materials - different colored stars and circles, toy soldiers and toy mice - were of equal significance to the child.

Of more interest are those studies which claim to disprove Piaget's assumption. Mehler & Bever (1967) showed that very young children are capable of discriminating the relative number of objects in two rows. In their experiment, the authors used two materials - plastic pellets and candy pellets - and concluded that a young child's discriminative ability was better with the more relevant material, the candy pellets (M & M's).

Mehler & Bever asserted that if you make the materials relevant you can make children conserve. Their basis for using the term conservation in the absence of a classical conservation test was not warranted. They state that their design was necessary to accomodate the experimental difficulties associated with interviewing two year old children. But their experiment was not a test for conservation: it merely showed that children could recognize perceptual illusions. It did not show that children are able to conceptualize equality or inequality when objects are spatially transformed. Conservation implies invariance across an overt transformation, and Mehler & Bever ignored this requirement.

Many experts have been critical of Mehler and Bever's study (Beilin, 1968; Piaget, 1968; Hunt, 1975), and later attempts at replication have provided only limited substantiation (Calhoun, 1971; Willoughby & Trachy, 1972). Piaget (1968) even stated that Mehler and Bever's research had nothing to do with conservation. Granted, this team did not use the traditional conservation paradigm, but it is difficult to see how their results are completely unrelated to the conservation problem. Their controversial results provided the impetus for one hypothesis of the present study, namely: the frequency of conservation responses varies significantly with the material used. A relevant material (candy bars) and a nonrelevant material (wood bars) are used in the present study.

Number of Objects

Typical Piagetian conservation problems involve six, and often ten, objects in each row (Lloyd, 1971; Piaget, 1952). Such large numbers, like irrelevant materials, may prevent young children from conserving. Several experiments have indicated that with small numbers, preschool children do treat quantity as invariant (Gelman, 1972; Smither, Smiley & Rees, 1974; Henry, 1976; Miller, 1976). But these experiments did not prove number invariance using a conventional conservation task. For example, Gelman (1972) used a magic show paradigm, thereby eliminating the overt transformation from the conservation experiment. The children in her study were not confronted with the contradictory perceptual information that children in a conventional conservation experiment encounter. Gelman found that children can tell that two objects are not the same as three objects. She demonstrated that young children do possess number invariance rules with small numbers, but she did not demonstrate that these children possess number invariance rules when they observe the transformation. Interestingly, in a more recent investigation of the young child's conception of number, Gelman and Tucker (1975) do not relate their number invariance experiments to the conservation task. The second hypothesis was derived in an attempt to carry Gelman's study to it's logical conclusion: to test

young children for conservation (invariance across an overt transformation) with the small numbers she used to prove invariance. This second hypothesis states that the frequency of conserving responses varies significantly with the number of objects used. It is tested by comparing each subject's responses to rows containing three, five, and seven objects.

Method

Subjects

Seventy preschool children, thirty-six males and thirty-four females, were tested. All Ss attended the Duke Memorial Weekday Preschool in Durham, North Carolina. Half of the Ss were randomly selected from three year old classes and the other half from four year old classes. The mean age of the entire sample was 51.78 months; standard deviation was 6.56.

Materials

Two types of stimuli were used: (1) miniature chocolate Hershey bars in their original dark brown wrappers and (2) miniature wood bars, identical to the Hershey bars in dimensions (4.4 mm x 2.4 mm x 0.6 mm), but lacking the relevant candy wrapper and chocolate smell. These wood bars were designed especially for the experiment; none of the Ss had ever seen such bars before. The two sets of fourteen bars were kept in individual boxes and were introduced to the Ss at separate times.

One low, nursery school size table was used for all the testing. The table's bright orange top contrasted well with the dark bars, and accented the spatial arrangement of these items. The table was divided in half by a piece of masking tape. During the testing, E and S were seated opposite each other on matching nursery chairs at a level comfortable for S.

Procedure. Each S was individually tested with both the candy bars and the wood bars. With each stimuli type, S was tested for conservation using two rows of three objects, five objects, and seven objects. Thus each S was tested for conservation six times. For each test, the S was asked the same three questions.

The order in which the candy and the wood bars were presented was balanced for the Ss, as were the ascending (3-5-7) and descending (7-5-3) numerical arrangements. The row transformation in each conservation test was also balanced. The four resultant orders were as follows:

Order I :	Candy	3-5-7	Wood	3-5-7
Order II :	Wood	3-5-7	Candy	3-5-7
Order III :	Candy	7-5-3	Wood	7-5-3
Order IV :	Wood	7-5-3	Candy	7-5-3

Eighteen Ss each were tested in Orders I and II; sixteen Ss each were tested in Orders III and IV. Each S was given the same introduction and instructions. The instructions which follow are based on Order I (Candy 3-5-7, Wood 3-5-7), but were easily altered for the other three orders.

Instructions:

Hi, My name is _____. Today we're going to play some games. See this table. It's divided into two parts by this piece of tape. This is your side (point to S's side) and this is my side (point to E's side). Now watch. I'm going to put some candy bars on your side and some on my side. (Three candy bars are placed evenly in two rows).

Question 1: Now,(S's name) are there the same number of candy bars on your side as there are on my side? (S answers). (E moves one row of candy bars apart.)

Question 2: Now, are there the same number of candy bars on your side as there are on my side? (S answers. E returns candy bars to original position, pauses and then moves the other row apart.)

Question 3: Now are there the same number of candy bars on your side as there are on my side? (S answers. E returns candy bars to original position.)

(E adds two candy bars to each row and repeats the above procedure. Then E adds two more candy bars to each row, making seven bars in each row, and repeats the procedure for a third time. The candy bars are put away, and the entire process is repeated using the wood bars).

Each S's test thus consisted of six identical sets of questions, one set for each of the six material-number combinations; each set was comprised on the above three questions. Each session lasted approximately fifteen minutes. E recorded S's responses during the session.

Scoring. S's answers to the six sets of questions were scored either pass or fail. A pass or conserving response was recorded only when the child answered an entire set of questions correctly. Any other result was recorded as a fail or nonconserving response. S would be labeled as a conserver, variable conserver, or nonconserver depending on his/her answers. A conserver answered all six sets correctly; a nonconserver answered no sets correctly; a variable conserver answered between one and five sets correctly.

Results

Two statistical analyses, as described by Siegel (1956), were used to test for significant differences in the number

of conserving responses. The Wilcoxon Matched-Pairs Signed-Rank Test was used to compare differences between the two materials, candy and wood bars. The Cochran Q Test was used to compare differences between the numbers three, five, and seven.

Of the seventy children tested, twenty-five gave conserving responses all the time, twenty-five gave conserving responses part of the time, and the other twenty never gave conserving responses. The mean ages and standard deviation, in months, of the three groups were calculated: Conservers, M = 51.7, S.D.= 6.16; Variable Conservers, M = 51.2, S.D. = 4.78; and Nonconservers, M = 50.4, S.D. = 6.25. Of interest here are the variable conservers, twelve males and thirteen females. Some of these children were represented in each of the four orders. Inspection of the raw data revealed that approximately half of the variable conservers were in the 3-5-7 order and half in the 7-5-3 order.

As a test of the first hypothesis concerning materials, a Wilcoxon Matched-Pairs Signed-Rank Test was performed. Table 1 summarizes the results. Using this test, it was

---

Insert Table 1 about here

---

determined that children exhibit significantly more conserving responses when candy is used ($p < .0001$).

Table 1

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
Conserving and Nonconserving Responses (3-0)
with Candy and Wood

VARIABLE CONSERVER	NUMBER CONSERVING RESPONSES CANDY	NUMBER CONSERVING RESPONSES WOOD	d	RANK OF d	RANK WITH LESS FREQUENT SIGN
1	1	0	+1	7	
2	5	1	+2	16	
3	3	1	+2	16	
4	3	2	+1	7	
5	1	0	+1	7	
6	2	2	0	-	
7	1	0	+1	7	
8	3	0	+3	20	
9	3	0	+3	20	
10	3	0	+3	20	
11	3	1	+2	16	
12	3	2	+1	7	
13	2	0	+2	16	
14	1	1	0	-	
15	3	1	+2	16	
16	1	0	+1	7	
17	1	0	+1	7	
18	3	2	+1	7	
19	2	3	-1	-7	7
20	2	2	0	-	
21	1	1	0	-	
22	1	0	+1	7	
23	1	0	+1	7	
24	3	2	+1	7	
25	3	2	+1	7	
					T = 7

Rank = 204
candy

Rank = 7
wood

$T_{(21)} = 7, p < .0001$

To test the second hypothesis concerning number of objects, the Cochran Q Test was used; Table 2 summarizes these results. It can be seen that the probabilities of conserving responses are significantly different with three, five, and seven objects ($p < .001$).

Insert Table 2 about here

The responses of the variable conservers are summarized in bar graph form in Figure 2. The ordinate of the histogram measures the proportion of conserving responses and the abscissa represents all combinations of material and number. The histogram shows a decrease in conserving responses with the irrelevant material and larger numbers. It appears that the candy-3 condition is superior to the wood-3 condition. Likewise, the candy-5 condition may be superior to the wood-5 condition. Even more striking is the fact that the variable conservers showed 100% responses with the candy-3 condition.

Insert Figure 2 about here

Discussion

These results indicate that both material and number affect conservation ability. Young children are more success-

Table 2

COCHRAN Q TEST

Conserving (1) and Nonconserving Responses (O) with Three, Five, and Seven Objects

	3 objects	5 objects	7 objects	L_i	L_i^2
1	0	0	0	0	0
2	1	0	0	1	1
3	1	0	0	1	1
4	1	1	0	2	4
5	0	0	0	0	0
6	1	0	0	1	1
7	1	1	0	2	4
8	1	0	0	1	1
9	1	1	0	2	4
10	0	0	0	0	0
11	0	0	0	0	0
12	0	0	0	0	0
13	0	0	0	0	0
14	1	0	0	1	1
15	1	0	0	1	1
16	0	0	0	0	0
17	0	0	0	0	0
18	1	1	0	2	4
19	1	1	0	2	4
20	1	0	0	1	1
21	1	0	0	1	1
22	0	0	0	0	0
23	0	0	0	0	0
24	1	1	0	2	4
25	1	1	0	2	4
	$G_1=15$	$G_2=7$	$G_3=0$	$L_i=22$	$L_i^2=36$

$P < .001$, $Q(.001,2) = 13.82$ $\qquad$ $Q_{(2)} = 22.53$, $P < .001$

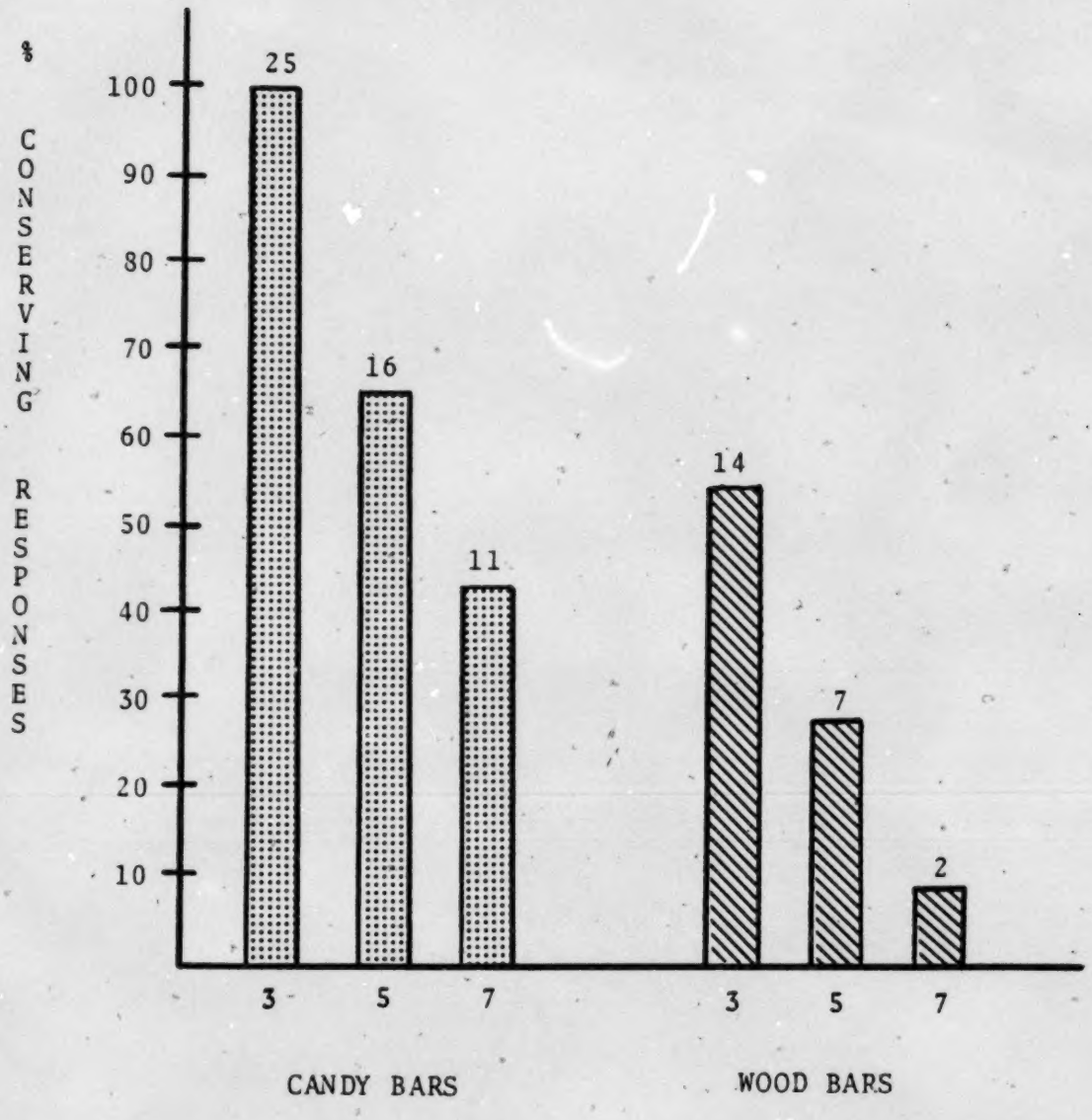


Figure 2. Number of conserving responses as the joint effect of material and number

ful at conserving with candy bars as opposed to wood bars, and more successful with smaller numbers than with larger numbers.

The material findings do not contradict Piaget's implied assumption concerning different materials. The same conceptualizing ability is tapped with both candy bars and wood bars. Using a more relevant material just makes it easier for children to conserve.

The number findings extend Gelman's study (1974) to its logical conclusion and support the findings of Lawson, Baron & Siegel (1974). They indicate that young children are conservers more often with smaller numbers than with larger numbers.

From the dissection of the number conservation problem, it is evident that two interacting forces are operating: the child is pulled one way by his logic and another way by his perceptions. Following a logical strategy, the child may think: "These two rows have to be the same. All the experimenter did was move the objects apart." Using a perceptual strategy, the child might say: "But those two rows look different." The child's answer to the conservation problem is dependent upon the relative strength of these two interacting strategies. Conservation occurs when a child's logic wins over his perceptions. With a conserver, logic always wins; with a nonconserver, logic never wins; and with a variable conserver, logic sometimes wins.

In this study, the variable conservers exhibited significantly more conserving responses with the candy bars. It may be that with this material the child was less likely to let the perceptual illusion dominate and more apt to actively use his logical strategy. With the candy, a child might have responded: "Three candy bars taste like three candy bars no matter how far apart they are." With the unfamiliar wood bars, the child may have had difficulty thinking in such concrete terms. With his logical strategy inactive, the child's immediate perceptions would dominate and the child would give a nonconserving response. The fact that subjects exhibited fewer conserving responses with the wood bars probably indicates that this misleading perceptual strategy is more difficult to overcome.

The subjects in this study also responded as conservers significantly more times when the smaller numbers were used. The perceptual illusion with three objects was probably not as strong as it was with five objects, and both of these illusions were probably weaker than was the illusion with seven objects. Of course, with any number of objects, the child did not necessarily use the relational information presented in the initial set and transformation to solve the final problem: he could have just counted the objects. This assumption is consistent with the results of Gelman & Tucker's absolute judgment experiment (1975). If a child counts,

his logical strategy is not operating fully and he is not conserving in the Piagetian sense. However, all of the subjects who behaved as variable conservers were not counting. Some of the subjects answered the questions too rapidly to have counted, even silently. Thus, for some subjects at least, the fact that more conserving responses were given with the smaller numbers probably indicates that such perceptual illusions are easier to overcome than those created with larger numbers. Children may perceive discreetly with small numbers, and yet take a global view of the problem when larger quantities are used.

Piaget (1952) wasn't interested in the perceptual illusion, per se. He used the perceptual illusion inherent in the conservation task to show how children think. Mehler & Bever (1967, 1968) just worked with the perceptual illusion; they showed that children were more successful at overcoming perceptual illusions with candy pellets in contrast to clay pellets. But their study did not say anything about conservation. This study has shown that children are more successful at conserving with candy bars as opposed to wood bars, and with smaller numbers in contrast to larger ones. From an educational or more practical perspective, the results suggest that using more relevant materials should facilitate a child's ability to learn. Making tasks more meaningful should nurture the development of a child's formal operational reasoning.

One defect of the present study deserves comment: the question format. By only asking the question in one form ("Are there the same number of candy bars on your side as there are on my side?"), there was room for an acquiescence response set. Rose (1973) has shown that young children tend to adopt an acquiescence response set. A subject could have attained conserver status just by repeatedly answering "yes" to all questions. Likewise, a subject could be classified as a nonconserver just by saying "no" to all questions. The design could have been balanced if half of the subjects had been asked the question in an alternate form ("Are there a different number of candy bars on your side and my side?"). However, since the analyses performed exclude both the conservers and nonconservers, the acquiescence response set cannot explain the higher preformance with candy as compared with wood bars. It will also not account for the relative differences in the number of conserving responses with three, five, and seven objects.

Summary

In an effort to discover what it is about the number conservation task which prevents young children from conserving, the task was dissected and two of its components were investigated: material and number. Seventy preschool children were tested with two materials, candy bars and wood bars, in rows containing three, five, and seven objects. The results

of the twenty-five variable conservers were analyzed. Using the Wilcoxon Test, it was determined that children exhibit significantly more conserving responses when candy is used ($p < .0001$). Using the Cochran Q Test, it was determined that the probabilities of conserving responses are significantly different with three, five, and seven objects ($p < .001$). These results indicate that large numbers and irrelevant materials may prevent young children from conserving. These results were discussed in terms of conservation as the case where a child's logic wins over his perceptions.

References

Beilin, Harry. "Cognitive Capacities of Young Children: A Replication," Science, 1968, 62, 920-921.

Calhoun, L.G. "Number Conservation in Very Young Children: The Effect of Age and Mode of Responding," Child Development, 1971, 42, 561-572.

Elkind, David. "The Development of Quantitative Thinking: A Systematic Replication of Piaget's Studies," Journal of Genetic Psychology, 1961a, 98, 31-46.

Elkind, David. "Quantity Conceptions in Junior and Senior High School Students," Child Development, 1961b, 32, 551-560.

Gelman, R. "Conservation Acquisition," Journal of Experimental Child Psychology, 1969, 7, 67-87.

Gelman, R. "Logical Capacity of Very Young Children: Number Invariance Rules," Child Development, 1972, 43, 75-90.

Gelman, R. & Tucker, M. "Further Investigation of the Young Child's Conception of Number," Child Development, 1975, 46, 167-175.

Higgins-Trenk, A. & Looft, W. "Cognitive Capacity of Very Young Children: Yet Another Replication," Journal of Psychology, 1971, 79, 285-289.

Hunt, Trevor D. "Early Number 'Conservation' and Experimenter Expectancy," Child Development, 1975, 46, 984-987.

Lawson. J.; Baron, J.; & Siegel, L. "The Role of Number and Length Cues in Children's Quantitative Judgments," Child Development, 1974, 45, 731-736.

Lloyd, Barbara. "Studies of Conservation with Yoruba Children/ Differing Ages and Experience," Child Development, 1971, 42, 415-428.

Mehler, J.; Bever, G. "Cognitive Capacity of Very Young Children," Science, 1967, 158, 141-142.

Mehler, J.; Bever, G., & Epstein. "What Children Do In Spite of What They Know," Science, 1968, 162, 921-924.

Piaget, Jean. The Child's Conception of Number, New York: Humanities, 1952.

Piaget, Jean. "Quantification, Conservation, and Nativism," Science, 1968, 162, 976-979.

Piaget, J. & Inhelder, B. The Growth of Logical Thinking from Childhood to Adolescence, New York: Basic Books, 1958.

Rose, S. "Acquiescence and Conservation," Child Development, 1973, 44, 811-814.

Rothenberg, B. "Conservation of Number Among 4 and 5 Year Old Children: Some Methodological Considerations," Child Development, 1969, 40, 383-406.

Smither, S.J.; Smiley, S.S.; & Rees, R. "The Use of Perceptual Cues for Number Judgment by Young Children," Child Development, 1974, 45, 693-699.

Siegel, S. Nonparametric Statistics, New York: McGraw-Hill, 1956.

Willoughby, R. & Trachy, S. "Conservation of Number in Very Young Children: A Failure to Replicate Mehler & Bever," Merrill-Palmer Quarterly, 1972, 18, 205-209.

Footnote

The author thanks Dr. Marcel Kinsbourne for his encouragement and advice during this research, and Mr. A. Jackson Stenner for his helpful comments during the writing of the present manuscript. The author also thanks the children, teachers, and administrative staff of Duke Memorial Weekday Preschool in Durham, North Carolina.